

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
26 April 2001 (26.04.2001)

PCT

(10) International Publication Number  
**WO 01/29879 A3**(51) International Patent Classification: **H01L 21/3065**,  
21/311, 21/312Fremont, CA 94539 (US). **HELLE, Wolfgang** [DE/DE];  
Kirchenstrasse 97, 81675 Munich (DE).

(21) International Application Number: PCT/US00/28955

(74) Agent: **MURPHY, Michael, J.**; Wilson Sonsini Goodrich  
& Rosati, 650 Page Mill Road, Palo Alto, CA 94304-1050  
(US).

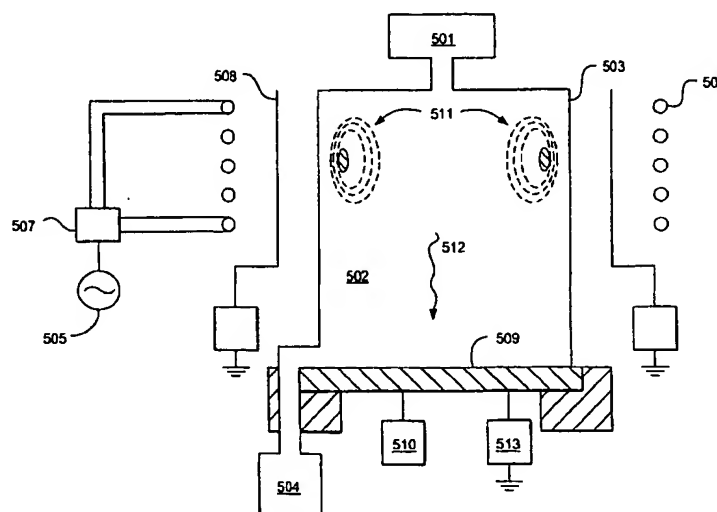
(22) International Filing Date: 19 October 2000 (19.10.2000)

(81) Designated States (national): JP, KR.

(25) Filing Language: English

(84) Designated States (regional): European patent (AT, BE,  
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE).

(26) Publication Language: English

(30) Priority Data:  
60/160,554 20 October 1999 (20.10.1999) USPublished:  
— with international search report(71) Applicants: **MATTSON TECHNOLOGY, INC.**  
[US/US]; 3550 West Warren Avenue, Fremont, CA  
94538 (US). **SAVAS, Stephen, E.** [US/US]; Apt. G,  
1357 Pearl St., Alameda, CA 94501 (US). **ZAJAC, John**  
[US/US]; 1137 Angmar Court, San Jose, CA 95121  
(US). **GUERRA, Robert** [US/US]; 45939 Omega Drive.(88) Date of publication of the international search report:  
24 January 2002For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.(54) Title: SYSTEMS AND METHODS FOR PHOTORESIST STRIP AND RESIDUE TREATMENT IN INTEGRATED CIR-  
CUIT MANUFACTURING

(57) Abstract: Plasma systems and methods for supplying activation energy to remove cross-linked photoresist crust using ion bombardment of the substrate from a plasma, at reduced temperature, achieved in part by operating the processing chamber at low pressures. Reduced temperatures prevent "popping" of the photoresist which can cause particulate contamination. The gas flow may comprise a principal gas, an inert diluent gas, and an additive gas. Principal gases for HDIS may comprise oxygen, hydrogen and water vapor at pressures less than about 200 mTorr and a bias may be applied to the substrate support. When low-k dielectric material is present on vertical surfaces, reduced ion bombardment on vertical surfaces may be used, and a protective layer may be deposited on those surfaces.

WO 01/29879 A3

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/28955

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : H01L 21/3065, 21/311, 21/312 US CL : 438/710, 725 According to International Patent Classification (IPC) or to both national classification and IPC														
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 438/710, 725 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Examiner assisted search tool (EAST)														
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>														
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.												
X --- Y	US 5,498,312 A (LAERMER et al) 12 MARCH 1996, col. 3, lines 33-65; col.5, lines 21-45, claims 1, 2, 10	1, 2, 3, 4, 7, 8, 10, 11, 18, 19-27, 30-33, 47, 48, 51-54, 60-65, 67 ----- 5-6, 9, 12-17, 28-29, 35-46, 49, 57-59, 68-70												
X	US 5,292,370 A (TSAI et al) 08 MARCH 1994, col. 3, line 33-col.4, line 64	1, 4, 10, 11, 16-18, 27, 60, 67												
X --- Y	US 4,393,092 A (GILL) 12 JULY 1983, col.3, line 64-col.4, line 66	47, 51, 60, 77 ----- 48-50, 52-59, 61-70												
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.														
<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>*A* document defining the general state of the art which is not considered to be of particular relevance</td> <td>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>*B* earlier document published on or after the international filing date</td> <td>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>*G* document member of the same patent family</td> </tr> <tr> <td>*O* document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>*P* document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family	*O* document referring to an oral disclosure, use, exhibition or other means		*P* document published prior to the international filing date but later than the priority date claimed	
* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention													
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone													
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art													
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family													
*O* document referring to an oral disclosure, use, exhibition or other means														
*P* document published prior to the international filing date but later than the priority date claimed														
Date of the actual completion of the international search 17 JULY 2001		Date of mailing of the international search report <b>02 AUG 2001</b>												
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer <b>RUDY ZERVIGON</b> Telephone No. (703) 308-0651 Jean Proctor Paralegal Specialist												